REMARKS:

Claims 1-34

Claims 1-34 have been rejected under 35 USC 103(a) as being unpatentable over Pinarbasi (US2003/0179513) in view of Saito et al. (US2003/0011948).

The analysis of obviousness was set forth in *Graham v. John Deere*, 383 U.S. 1, 148 USPQ 459 (1966). In order to establish a *prima facie* case of obviousness, three basic criteria must be met:

> First, there must be some *suggestion or motivation*, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the teachings of the references. Second, there must be a *reasonable expectation of success*. Finally, the prior art reference or combined references must teach or suggest *all the claim limitations*. *The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art*, and not based on applicant's disclosure (*In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991; emphasis added).

Applicants respectfully traverse the rejection as failing the *Graham* test. Specifically, the combination proposed in the rejection fails the third element of the *Graham* test. The requirement of the third element is clear: the prior art reference or combined references must teach or suggest *all the claim limitations*.

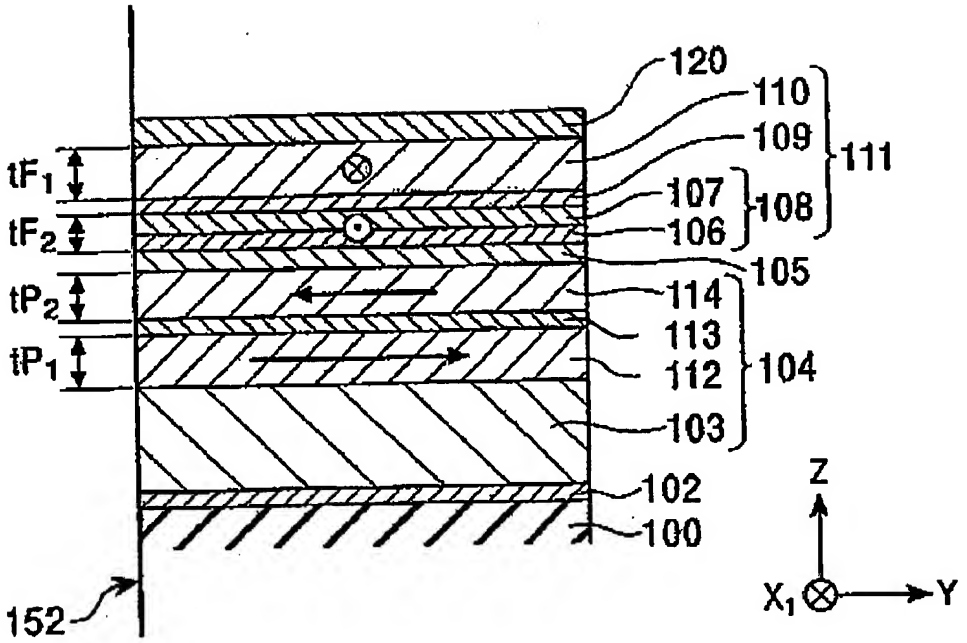
Claims 1-17 and 33 require that the net magnetic moment of the AP pinned layer structure is about equal to zero. As conceded in Section 2 of the Office Action, Pinarbasi does not state that the net magnetic moment of the pinned layer structure equals about zero. Saito has been added to provide this feature. However, upon closer examination of Saito, it appears that Saito actually teaches AP pinned layer structures that have a net magnetic moment that is purposely made to be not about zero. The rejection points to paragraph 0017 of Saito, reproduced immediately below.

> **[0017]** The direction of magnetization of the first pinned

> magnetic layer **112** is anti-parallel to the direction of magnetization of the second pinned magnetic layer **114**, and the magnetic moment of the first pinned magnetic layer **112** cancels the magnetic moment of the second pinned magnetic layer **114**. However, since the thickness tP_1 of the first pinned magnetic layer **112** is slightly larger than the thickness tP_2 of the second pinned magnetic layer **114**, a few magnitude of spontaneous magnetization remains due to the contribution of the first pinned magnetic layer **112** to leave the pinned magnetic layer **104** to be in a ferrimagnetic state. This spontaneous magnetization is further amplified by the exchange coupling magnetic field with the antiferromagnetic layer **103** to fix the direction of magnetization of the pinned magnetic layer **104** toward the Y-direction. (*emphasis added*)

As noted, the thicknesses of the pinned magnetic layers are made different, giving an overall net magnetic moment that does not equal zero, as net magnetic moment is a function of thickness of the magnetic material. Particularly, the thickness of the first pinned layer 112 is greater than the thickness of the second pinned layer 114 so that not only does the magnetic moment of the first pinned magnetic layer cancel out the magnetic moment of the second pinned layer, but also provides "a few magnitude of spontaneous magnetization," in other words, a net magnetic moment of some magnitude greater than about zero. This assertion is proven when viewing Saito's FIG. 30 (reproduced below), which shows the arrows representing the magnetizations of pinned layers 112 and 114 as being of different magnitudes, thereby indicating that the pinned layer structure 112/113/114 has a net magnetic moment much greater than about zero.

FIG. 30
PRIOR ART



The other embodiments disclosed in Saito likewise have AP pinned layer structures having net magnetic moments purposely made to be greater than about zero. Note, *inter alia*, Saito's FIGS. 2, 8, 10 and 12.

Additionally, Saito indicates that the pinned layer structure is in a ferrimagnetic state in paragraph 0017. A "ferrimagnetic state" is referred to in Saito paragraph 0030 in relation to the free layer as satisfying the relationship $M_1t_1 > M_2t_2$. This relationship requires a net magnetic moment that does not equal about zero. A definition of ferromagnetic is: noting or pertaining to a substance, as a ferrite, in which the magnetic moments of some neighboring atoms point in opposite directions, with a net magnetization still resulting because of differences in magnitudes of the opposite moments. [Source: *Random House Unabridged Dictionary,* Copyright © 1997, by

Random House, Inc., on Infoplease (www.infoplease.com), *emphasis added.*] From this definition, it is seen that a net magnetization exists in Saito's ferrimagnetic AP pinned layer structure.

Accordingly, it cannot be said that Saito teaches or suggests an AP pinned layer structure having a net magnetic moment of about zero as claimed. The rejection thus fails the third prong of the Graham test. Reconsideration and allowance of claims 1-17 and 33 is respectfully requested.

Regarding claims 18-32 and 34, Applicant respectfully traverses the rejection as failing the first and third prongs of the *Graham* test.

Regarding the first and third prongs of the *Graham* test, those of suggesting the proposed modification and of teaching or suggesting all claim limitations, Applicant first notes that the claimed range for the antiferromagnetic layer thickness is about 50-100Å. The rejection indicates that because Pinarbasi discloses an "exemplary" PtMn thickness of 30Å, this implies that the thickness is variable. However, the lower end of the claimed range (50Å) is almost *twice as thick* as Pinarbasi's exemplary thickness. The upper end of the claimed range (100Å) is *over three times as thick* as Pinarbasi's exemplary thickness. It is simply too far of a stretch to say that Pinarbasi's 30Å AFM layer can be varied to meet the claimed 50-100Å AFM layer.

As substantive proof that Pinarbasi does not suggest that AFM layer 216 be thicker than 30Å, the Examiner is directed to Pinarbasi paragraph 0042, which states: "The seed layer structure **208** may include first, second, third and fourth seed layers (SL1), (SL2), (SL3) and(SL4) **210, 212, 214** and **216.** The seed layers, with the thicknesses and materials shown, have been found to promote a desirable texture of the layers deposited thereon." Pinarbasi indicates that the thickness shown (30Å) is important to formation of layers thereon, and so does not suggest that the thickness is variable. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Although a

prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so." 916 F.2d at 682, 16 USPQ2d at 1432.). The suggestion or motivation is simply not present in the combination of references proposed in the rejection.

In fact, it appears from paragraph 0042 that Pinarbasi actually teaches away from varying the thickness of AFM layer 216. A *prima facie* case of obviousness may also be rebutted by showing that the art, in any material respect, teaches away from the claimed invention. *In re Geisler*, 116 F.3d 1465, 1471, 43 USPQ2d 1362, 1366 (Fed. Cir. 1997).

The rejection also notes that Pinarbasi discloses a 150Å AFM layer (332). However, this AFM layer 332 (Fig. 11) pins the pinned layer 328, not the AP coupled layers 314, 316. *See also* layer 248 of Pinarbasi's Fig. 10, which pins pinned layer 244. Thus, AFM layer 332 has no relevance to examination of the claims.

Nor has the Examiner provided a reasonable motivation based on knowledge generally available to those skilled in the art and not provided by Applicant in the present disclosure.

> "To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." Ex parte Clapp, 227 USPQ 972, 973 (Bd.Pat.App.&Inter.1985).

Here, the Examiner has indicated that the motivation to modify Pinarbasi is based on experimentation. However, as pointed above, Pinarbasi suggests that the thickness of the PtMn seed layer 216 not vary. Presumably, one skilled in the art would not attempt to double the seed layer thicknesses, given that Pinarbasi has presented properties that work well. Thus, the only conclusion that can be drawn is that the combination of features proposed in the rejection has been impermissibly drawn from Applicant's disclosure.

For any of these reasons, the rejection fails the first and third prongs of the *Graham* test. Reconsideration and allowance of claims 18-32, 34 is respectfully requested.

In the event a telephone conversation would expedite the prosecution of this application, the Examiner may reach the undersigned at (408) 971-2573. For payment of any additional fees due in connection with the filing of this paper, the Commissioner is authorized to charge such fees to Deposit Account No. 50-2587 (Order No. HSJ920030118US1).

Respectfully submitted,

By: _____ Date: 1/18/06

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